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Abstract. The implementation of information systems (IS) in organizations often triggers new situations in which users experience a disruption of existing work patterns and routines. Sensemaking becomes central in making users' meanings explicit, serving as a foundation for further actions and interactions with the new technology. The purpose of this paper is to study how users make sense of new technologies by building on existing response repertoires. Empirically, we present findings from a study of an Electronic Patient Record (EPR) system implementation in two Danish hospital wards. Our findings illustrate: (1) how doctors' and nurses' existing routines are disrupted by the new technology, (2) how identity construction plays an important part in the users' meaning construction process, and (3) how self-fulfilling prophecies are formed as a natural part of their sensemaking. The study contributes to existing literature by providing a detailed account of how users' early sensemaking of a technology influences their subsequent actions and reactions towards it. Our findings support managers in understanding users' perceptions of a new technology, helping them in planning and executing the implementation process.

Keywords: IS implementation, sensemaking, response repertoires, identity construction, self-fulfilling prophecies, electronic patient records.

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1 Introduction

Over the last decade, health authorities all over the world have invested significant sums of money in information system (IS) initiatives to enable a coherent, effective, and innovative disease and patient management (Jones 2004; Currie and Guah 2007; LeRouge et al. 2007; Wilson and Sloane 2007). A significant trend has been the replacement of paper-based patient records with Electronic Patient Record (EPR) systems to support the examination, treatment, and care of patients. EPR systems are presumed to improve work processes through efficient documentation, to reduce medical errors, and to facilitate increased information sharing and communication among professionals. Furthermore, EPRs are expected to raise the quality of care, cut waiting time, and optimize the time of patient hospitalization (Svenningsen 2002; Vikkelsø 2005).

Whereas the implementation of EPR systems is expected to generate a number of benefits, it implies drastic changes in clinical practices. Studies show how these systems prove more difficult to embed into the clinical practice than first assumed (Jensen and Winthereik 2002; Ellingsen and Monteiro 2003; Vikkelsø 2005), and a number of challenges related to their implementation and use have been documented (Berg 1999; Lundberg and Tellioglu 1999; Cho and Mathiassen 2007). EPRs are characterized as highly complex systems that involve radical changes in the everyday work of healthcare professionals. They are often mandatory to use, and their introduction implies disruptions of existing work processes, habits, and procedures, along with a negotiation of new roles and responsibilities among healthcare professionals. They cause what Weick (1995) refers to as a 'shock,' which introduces a certain degree of ambiguity and uncertainty among those involved in the change process.

These previous studies provide evidence of barriers and difficulties of IS implementation in healthcare; however, they do not adequately explain how EPR systems become embedded in the everyday organizational work practices as part of users' sensemaking processes. Little is known about how users actively enact these systems in practice. On this backdrop, we pursue the following research question: How do users make sense of new technologies as they become enacted in their everyday work practices? We apply Weick's (1995) sensemaking theory to understand the implementation of EPR systems in healthcare as a social process that is unfolding in the interrelationship between technology, users and the organizational context. More precisely, we investigate what happens during the early phase of IS implementation, also called the exploration phase (Henfridsson 1999), where healthcare professionals draw on various sets of cues within their existing frame in order to construct meaning of the EPR system. We show how users rely on established professional identity, existing routines, and create self-fulfilling prophecies in the early enactment of the technology. This meaning creation process is important, as it influences the users' subsequent actions and reactions towards the system.

The contribution of the study is twofold. First, we show how the use of sensemaking theory as an analytical lens provides insightful knowledge about the relationship between information technology and organizations (Henfridsson et al. 1997, p. 53). Second, our study contributes to IS research in healthcare by providing a detailed analysis of how EPR systems become enacted in the early exploration phase as part of the healthcare professionals' sensemaking processes. We argue that IS implementation should be understood as a process of mutual co-construction of the technology, the users, and the work practices. Our findings support managers in understand-

ing users' perceptions towards a new technology, helping them in planning and executing the implementation process.

The paper is structured as follows. The next section reviews existing studies on users' meaning constructions of IS implementation. We then present sensemaking theory and especially three constructs—bracketing, enactment, and identity—that help us in understanding what takes place in the early phase of IS implementation. Next, we outline the research method and describe the case settings. Subsequently, the findings are presented and discussed. We conclude the paper by discussing its contribution and by suggesting implications for research as well as practice.

2 Users' meaning constructions of information system implementation

In the literature, the implementation of technology in organizations is considered to be a process unfolding in the interaction between users and technology in a local context (Vaast and Walsham 2005). Orlikowski and Robey (1991, p. 153) argue that "it is only through the activation or appropriation of information technology (Poole and DeSanctis 1989)—physically or socially—by humans in performance of their tasks, that it comes to play a meaningful role in organizational processes." Humans continuously construct new understandings of the role and utility of the new technology and how it can be applied to their activities. These perceptions influence the way in which the new technology gets used and hence mediates its impact on group outcomes (DeSanctis and Poole 1994).

In line with this argument, previous studies in this field of research suggest that higher priority should be given to social aspects of IS implementation (Barley 1986; Schultze and Boland 2000; Vaast and Walsham 2005) where the implementation and use of technology is influenced and created by those who are going to use the technology (Barley 1986). Vaast and Walsham (2005) call for studies examining the representations that shape users' understanding of their work and of the technology by focusing on human agency and social interpretation in order to explain the various outcomes from the use of technology. Users are more or less free to enact technologies in different ways, and they adapt the use of technologies in response to local needs (Boudreau and Robey 2005). By reconceptualizing the user as a social actor, it is possible to study users' perceptions and attitudes towards IS and, at the same time, to take into consideration the organizational context that shapes IS implementation (Lamb and Kling 2003).

Common to these studies is that they are oriented towards the social and organizational aspects of IS implementation and the co-construction of technology, users, and work practices. It is by focusing on these aspects that we as researchers and practitioners get an understanding of the mechanisms at play in an IS implementation which may then help us in defining appropriate strategies for integrating the technology into the work practices. These previous studies, however, do not provide sufficient insights into how users make sense of an IS implementation, i.e., what repertoires or frames they build on when constructing meaning, and how this meaning construction influences their actions and reactions towards the technology. We therefore

suggest the theory of sensemaking as an analytical lens to capture users' meaning constructions of technology.

3 Sensemaking theory to capture users' meaning construction

Sensemaking originates from the field of organization studies and is defined as the "making of sense" (Weick 1995), where sense refers to meaning and making refers to the activity of constructing or creating something. It specifically addresses cognitive and social mechanisms for dealing with unexpected events—e.g., the introduction of new technology—in situations where a high degree of ambiguity and uncertainty is present (Weick 1995).

Sensemaking is central because it is the primary site where meanings are constructed that inform and constrain identity and action (Weick et al. 2005). It is particularly relevant in studies of early IS implementation, as this phase is characterized by a high degree of ambiguity and uncertainty, and since meaning creation about the technology is particularly intense in this period. The technology interrupts organizational members' established ways of working, their identity perception, and how they see the world, causing what Weick refers to as shocks. These shocks trigger explicit efforts at sensemaking where users try to make sense of the new situation in order to resume the interrupted activity and stay in action. To do so, the users build on existing response repertoires by looking for reasons pulled from stocks of routines, habits, capabilities, expectations, traditions, organizational premises and institutional constraints (Christianson et al. 2009; Tripsas 2009).

In IS research, sensemaking theory has been used to study how users create meaning about a technology and how they act towards it (Orlikowski and Gash 1994), how users strive to achieve their respective goals and fulfill their needs by reflecting upon what is meaningful to them with respect to their profession and work activities (Henfridsson 1999), and how a sensemaking perspective helps managers to clarify users' values, needs, and priorities when implementing IS (Bansler and Havn 2004). In a healthcare context, we find few studies that are informed by, and make use of, sensemaking theory to study IS implementation. For instance, Apker (2004) emphasizes the importance of identity construction in managed care by arguing that sensemaking among nurses generates interpretations of change that are grounded in their care giving role. Kohli and Kettinger (2004) investigate how technology is enacted in practice by studying the interdepen-dencies between actors, technology, and contextual factors. Hedström (2007) takes the various user groups' interests and values into account when studying the development, implementation and use of IS in elderly care; however, this is done without mentioning sensemaking explicitly. Jensen and Aanestad (2007) make explicit use of sensemaking in a study of EPR implementation which shows how healthcare professionals' sensemaking processes are constructed from their conceptions of the technology, their professional role and aspects specifically related to the implementation process.

As a further development of the conclusions drawn by these studies on the use of sensemaking theory, we set out to study how healthcare professionals make sense of the implementation

of IS (more specifically the EPR system) and what actually guides them in their early sensemaking. In doing so, we focus on three key constructs from sensemaking theory: bracketing, enactment, and identity. According to Weick (1979), bracketing is a process of coping with an ongoing flow of information by extracting certain cues which then become the targets for the sensemaking process. In other words, to experience something in a flow of events, people engage in sorting activities to single out cues and events and to connect them. The bracketed portion of the environment is therefore a different environment than the original (Weick 1979, p. 154). In the context of IS implementation, bracketing takes place when users of a given technology identify specific features, functionalities or uses of a technology while disregarding others. It is most likely that different users bracket different cues, and this means that the same technology does not necessarily lend itself to similar interpretations by different groups of actors. In this way, technologies are equivocal in nature and they may imply "[s]everal possible and plausible interpretations" (Weick 1990, p. 2).

Following the process of bracketing, the cues are enacted by relating them to the repertoire of frames or certain preconceptions that an individual holds. By enacting the cues, the individual creates the reality that he or she responds to (Weick 1995, p. 35-36) which later may turn out to be an opportunity or a constraint. Boudreau and Robey (2005) argue that individuals enact technologies in response to their local experiences and needs and that they may choose to use the technology: "… minimally, invoke it individually or collaboratively, and improvise in ways that produce novel and unanticipated consequences" (Boudreau and Robey 2005, p. 4). In the process of enactment, the individual confirms his or her preconceptions. In other words, the individual forms the reality that he or she sees, which is expressed in the statement that "believing is seeing" (Weick, 1995). When this constructed reality then guides the behavior of the individual, preconceptions confirm behavior which again confirms preconceptions eventually creating self-fulfilling prophecies.

The processes of bracketing and enacting are both grounded in identity beliefs of who we think we are as an organizational actors, which then shapes what we enact and how we interpret the environment (Weick et al. 2005, p. 416). In the context of IS implementation, users draw from their identity by looking for cues that they believe can help them stay in action. The identity serves as a filter where organizational actors notice and interpret the change in a manner consistent with their existing identity. Because identity over time becomes intertwined in the routines, beliefs, and procedures, guiding the organizational actors in their everyday work, explicit effort to change this identity may become difficult (Tripsas 2009). This means that the users interpret the technology in light of their well-established roles and responsibilities as "who they are", i.e., as doctors and nurses. Their identity thereby forms the sensemaking, but the sensemaking also informs their identity by confirming or questioning the existing understanding of who they are.

We find the constructs of identity, bracketing and enactment particularly relevant when studying early implementation of technology, as they provide insights into how users think about and relate to technology by focusing on their interpretations of the technology rather than on rational choices. In the findings section, we illustrate how the healthcare professionals made sense of the EPR system by exploring the processes of bracketing and enacting, as well as how they interpreted the technology in relation to their identity. Before doing so, we describe the context of the study and the research design.

4 Research setting and methodology

4.1 Research setting

The empirical material presented in this paper is part of a larger research project (Jensen 2007) of two Electronic Patient Record (EPR) implementations in a cardio-thoracic surgery department and an orthopedic surgery department in two hospitals in Denmark. The cardio-thoracic surgery department takes care of adult surgical treatment regarding heart, pneumonia, and throat surgery. On a yearly basis 1,320 patients are treated in the department (emergency and planned). The department consists of a standard unit, an out¬patient clinic, a perfusion department, and a secretaries' office. The standard unit which is the empirical focus of this study employs 48 nurses and ten doctors. It has a capacity of 28 beds. The orthopedic surgery department has an average of 3,000 admis¬s¬ions (emergency and planned) per year and consists of a standard ward, an outpatient clinic and a secretaries' office. Ten doctors, including one managing consultant doctor, and 50 nurses are employed at the department. They are specialized in shoulder, knee and hip alloplastics, as well as foot surgery.

The case studies of this study focus on the implementation and early use of EPR systems in the two departments. The purpose of the EPR implementations was to determine the benefits of introducing EPR systems in relation to optimization of work practices, quality enhancement of patient treatment, and economic effects. Later, the projects served as pilot projects for future EPR implementations in other hospitals in the regions.

The EPR systems introduced represent an interdisciplinary electronic version of patient paper records. These records are stored electronically which makes it possible for healthcare professionals to access patient data and enter new data into the system simultaneously from different sites. The EPR comprises nursing notes, progress notes, physiotherapist notes, diagnoses, medicine schemes, history data, information on temperature and blood pressure, X-rays and laboratory data. The systems are off-the-shelf systems meaning that only minor modifications can be made. The healthcare professionals have had the possibility to define their own terms in the system according to their specialization, but the EPR standards have imposed some discipline on the users regarding consistency in, e.g., data entry and medication procedures. Using the EPR systems is mandatory in both settings, which means that the professionals have brought the main functionality of the EPR system into their daily clinical practices.

The managers of both hospitals promoted the EPR system as an important and indispensable tool for optimizing the work procedures in the hospital, and for providing the best possible treatment and care of the patients. Among the official reasons behind implementing the EPR system were the following: (1) The electronic record will always be accessible and brought up to date; (2) The patient will be treated on the basis of only one set of information; (3) The medicine prescription will be safer since the risk of making mistakes is reduced; and (4) The quality of treatment will be better because of a unified documentation system. In the analysis section we show how some of these expected benefits were met in practice, but also how both doctors and nurses enacted the EPR system in ways that not always conformed to the initial aims.

4.2 Research design

For this study we adopted a contextualized and interpretive approach, building on case study design (Pettigrew 1990; Walsham 2006). Interpretive research attempts to understand phenomena through the meanings that people assign to them, and access to reality is through social constructions such as language, consciousness, and shared meanings (Myers and Avison 2002). This approach is particularly relevant in this study where the aim is to assess assumptions, expectations, and experiences among the healthcare professionals. The approach is also well in line with the sensemaking approach where Weick (1995) points to qualitative and naturalistic methodologies for conducting research.

The first author collected empirical data between August 2004 and December 2005 in immediate continuation of EPR implementation in the two departments. Users' early interpretations of technology are of great importance, as it is in this phase that users explore the system and adapt it to their daily work practices (Orlikowski and Gash 1994). By focusing on this phase, we were able to explore how the technology was constructed and adopted to work practices, as well as how it became part of the work routines. Despite the relatively short time frame, the majority of the doctors and nurses were more or less familiar with the functionality of the EPR system. An important point, however, was that using the EPR systems reflected a certain degree of ambiguity and uncertainty, especially as new roles and responsibilities still had to be negotiated between the groups of healthcare workers (see Jensen 2007).

Different data techniques were used, including observation studies, interviews, and written materials. The study entailed participant observation in the departments where doctors and nurses were observed in their natural settings. We participated in ward rounds, morning conferences, patient consultations in the outpatient clinic, and the healthcare professionals' interaction with the EPR system (e.g., documentation of patient notes, medicine prescription, and requisition of examination results). This served to improve our understanding of how the professionals interacted with the EPR system during their daily work routines and provided background information in relation to the interview situation. Written material and documentation, such as project plans, organization charts, user manuals, and newsletters, served as contextual information.

The primary data collection technique was based on 24 semi-structured interviews conducted with 10 doctors and 14 nurses. The interviews lasted between 60 and 90 minutes, and focused on the healthcare professionals' immediate perceptions of, and reactions to, the EPR implementation. Our interview guide was informed by sensemaking theory and motivated by a number of questions addressing the users' experiences with the technology. The guide included questions such as: What are the expected gains from having an electronic record compared to the paper-based record? Have these expectations been realized in practice? Have there been any changes in roles and responsibilities after the introduction of the EPR system? How is the EPR system used to support the daily work procedures? What influence does the system have on existing work practices? How is the EPR system perceived? We related the statements made during the interviews to what we had observed and read in the various documents, such as the project plans and requirement specifications. As a follow-up activity, a focus group interview was conducted with a group of doctors to get feedback on the initial findings. In the case of the nurses, the findings were reported in writing for comments and verification.

The analysis process was inductive, grounded in the empirical findings. We first read the transcripts of the interviews and the field notes carefully to highlight and categorize the different statements and observations of user perceptions. The first readings were rather structured and closely related to the empirical data, ensuring that the categories were identical to the informants' own expressions and accounts. In the further data analysis, we were able to draw out a number of examples of how nurses and doctors' early experiences formed their actions and reactions towards the use of the EPR system. We used the three theoretical concepts of bracketing, identity construction, and enactment as guidance for coding. Through the analysis process, various meanings about the EPR system surfaced, and we were able to outline how the professionals' sensemaking of the EPR system was highly grounded in existing routines, habits, expectations, traditions, clinical values, and institutional constraints. In order to illustrate what happened in this sensemaking process, we formulated three headings: (1) Disruption of existing routines, (2) Sensemaking as part of identity construction, and (3) The creation of self-fulfilling prophecies. In what follows, we describe how the EPR system was enacted in practice during the exploration phase along these three dimensions.

5 Findings

5.1 Disruption of existing routines

The implementation of the EPR system implied some degree of ambiguity and uncertainty as the professionals' existing routines were disrupted. In the beginning, the EPR system did not constitute any natural place in the organization; consequently, the routine behaviors established around the paper-based patient records could not be continued. Both doctors and nurses had to decide upon what was meaningful and what made sense in this new situation. In the exploration phase, the healthcare professionals asked questions about the changes that the EPR system would have on their existing work processes, routines, roles, and procedures.

A process was initiated where the professionals started to negotiate new roles and responsibilities. Both nurses and doctors were, to a large extent, actively involved in defining what purposes the EPR should be used for and how it was to be used in relation to the clinical practice. This definition was determined by the overall frame of the EPR system being chosen. As part of a bracketing process, the professionals were searching for cues that would somehow fit their pre-defined programs of action (also known as response repertoires). For instance, the nurses responded rather positively to the implementation of the EPR, as they could see a number of possibilities in terms of what the system could add to their professional work. One such possibility was to be able to make well-documented nursing notes in the EPR system to help create a better overview of each patient and maintain high quality nursing notes. This was made possible by the structure of the system which encouraged a process and problem-oriented documentation as well as a more cross-disciplinary approach, thus replacing the traditional, chronologically oriented structure. Consequently, they believed that the EPR system would provide a better structure

by presenting patient information more logically, compared to what was possible with the paper version. Another advantage was that documents would not become mixed up as had sometimes been the case with paper copies. Apart from facilitating a better overview and creating a better structure, the nurses also expected the EPR system to serve as a communication media between different groups of professionals to a higher extent than what had previously been possible.

As part of the early exploration phase, the doctors also bracketed various cues about how the EPR system could improve their work practices. Their main interest was to get a tool to support and facilitate their documentation procedures. They expected the system to facilitate medicine prescription by introducing standard prescription procedures and by making prescriptions more secure (as it was only doctors who had the rights to perform these procedures in the system). Like the nurses, the doctors perceived the EPR system to be a way to improve the quality of patient treatment and care.

However, the expectations of improving existing work practices were challenged and questioned in an ongoing sensemaking process, where various concerns about abandoning the traditional paper-based record surfaced and had an impact on both doctors and nurses' reactions to the system. For instance, doctors referred to the system as a control mechanism: "There is too much control of our work," and the majority experienced the use of the system as too time-consuming, as it was taking time away from patient treatment: "Now we use around 50% of our time on administrative tasks." The control and time aspects of the EPR system manifested themselves as disruptive and constraining mechanisms on the doctor's clinical practice. To some extent, these aspects overshadowed the expected affordances, and influenced the doctors' commitment to, and use of, the system negatively.

The nurses also experienced this disruption of existing routines. They reflected concern about abandoning the traditional paper-based records despite the gains that they expected the EPR to introduce. Some nurses stated their frustration about lack of competences: "I'm not a skilled computer-user." Others were concerned that they would not get a proper overview of the patient data in the EPR system to be able to provide the best possible care: "I long for our previous practice with the paper record, where I could look up page 3 and find all relevant information about the patient." The nurses also felt that more time was used in the nursing office at the expense of time for bedside care.

Together, these examples indicate how nurses and doctors faced some degree of ambiguity, with several unanswered questions about the future role of the EPR system. During their initial encounter with the system, they tried to extract cues and define its affordances. To reduce some of this ambiguity, the professionals seemed to focus on the cues that were bound to traditional work practices and their existing clinical frame, e.g., to provide the best possible patient treatment and care. Both groups defined the EPR system as a tool for information retrieval and for documentation purposes in the same way that the paper record system was perceived to be. This did, to some extent, prevent them from exploring other possible ways of using the technology, in other words, it became difficult to break old habits. By enacting the EPR as a tool primarily related to one's own profession, doctors and nurses similarly prevented themselves from other possible uses of the technology, e.g., to support more collaborative work. Although the introduction of the system disrupted existing routines, both groups tried to look for cues that would fit their pre-defined programs of action. Without establishing this connection between cues and

frames, meaning could not be produced. In this ongoing and intense bracketing process, the identity construction of both groups played an important role.

5.2 Sensemaking as part of identity construction

In both departments, the introduction of the EPR systems involved a high degree of identity construction and maintenance. Both doctors and nurses' meanings about the EPR system were created in light of their existing professional identity. At the same time, the affordances that both groups saw in the system redefined their identity. For instance, the doctors defined themselves as craftsmen whose job it was to perform operations and treat patients. Their objective was to carry out hip replacements. "Everybody in my profession is characterized by being a carpenter, a bricklayer, a butcher, and a seamstress at the same time." Having to interact with the EPR system implied alienation from their profession, and the system implied new work tasks that the doctors were not familiar with—"[using a computer] is unfamiliar to me." They therefore experienced difficulties in relating the identity of computer user to their profession as surgeons where they advanced the patient treatment as a key value in their professional work.

Furthermore, it was important for the doctors as professionals to be involved in the decision-making process when choosing the right EPR system: "The EPR system is something that highly influences our practice and it is a central tool in our work procedures so we need to be involved in choosing the system, but also in deciding how to implement it." The doctors, however, were not consulted in the implementation process. They had no influence on the choice of EPR system since they were not consulted in how to best implement it: "They [the managers] have not even asked an old-timer like me for advice." Only one doctor was chosen as a super user who then helped the others in getting familiar with the system. The majority of doctors felt that their professional identity as "someone you ask for advice" was undermined, leading to a loss of authority and status. This frustration was reflected in the doctors' actions during the implementation where they rarely showed up at meetings, and only a minority showed enthusiasm for using the system. It was easy for them to blame "the others" when arguing that the EPR system lacked important functionality, or when the system did not support their daily work.

Another important issue was the doctors' expectations that the EPR system would help them ensure a practice living up to high professional quality and security standards. As previously mentioned, the EPR system would introduce new medicine prescription procedures for doctors to type prescriptions directly into the system as opposed to dictating them to secretaries. This procedure was expected to limit typing errors, ensuring more secure medicine prescriptions. Although the doctors' expectations of more secure work practices were realized by the use of the system, it introduced a paradox, as the doctors now had to use much more time in front of the computer to type in medicine prescriptions as opposed to treating patients. In this way, the EPR system challenged their identity as craftsmen by introducing the characteristic of being computer users.

Furthermore, the doctors experienced that they now had to perform what was before considered to be the work of secretaries and nurses. They had to: "refer the patient [to a physiotherapist]" by typing the appointment into the system. This was normally a task for the secretary

which implied not only an extra task for the doctor, but was also perceived as a step in undermining their status and authority.

As in the case of the doctors, the nurses' identity construction influenced how they made sense of the EPR implementation. The nurses defined themselves as care providers who were able "to control things to ensure that nothing goes wrong in relation to the patients; that no information gets lost and that the quality of the nursing notes is not compromised." They expected the EPR system to lead to improvements not only in their nursing practices, but also in their professional position as nurses. They expected the EPR technology to strengthen the professionalism of their nursing activities by providing more visibility and accountability to their work. Some of these expectations were realized; for example, the nurses experienced increased influence and visibility of their nursing activities, as other healthcare groups (i.e., doctors) now could access the nursing notes in the EPR system more easily than before. Consequently, the introduction of the EPR system was considered to be a means of strengthening their position in the hierarchy and thereby gain more authority in relation to doctors. The EPR system helped to make the documentation and nursing responsibilities more transparent. In addition, nurses were able to make more qualified documentation, as they no longer had to document the same aspects as the doctor, and the documentation was becoming more structured and problem oriented. The system helped them in keeping track of their responsibilities and in describing and legitimizing their interventions. On the negative side, however, they were spending less time with patients: "We should spend our time with the patients and not in the office," thereby feeling distanced from their usual procedures.

The nurses experienced the system to have a more positive impact on their identity construction (role and responsibilities) than was the case of the doctors. They saw the introduction of the EPR system as a way to construct an even stronger professional identity and to make their work more visible. For the doctors, on the other hand, it was important to sustain their highly recognized professional identity and not to compromise their already established authority and recognition in the clinical setting. For both groups, patient treatment and care were the core values that constituted their professional identity, and the EPR system was considered more as a technology that was needed for administrative purposes and less for enhancing clinical work directly, which had consequences for their interaction with, and acceptance of, the system.

5.3 Creation of self-fulfilling prophecies

On some occasions, the doctors and nurses' sensemaking processes of the EPR implementation and use resulted in self-fulfilling prophecies. Both doctors and nurses had preconceptions of the limitations of the technology. In the two cases we see examples of how these expectations influenced the behavior of the health professionals when they refrained from using the technology. When they then following criticized the technology for not being useful, they created a self-fulfilling prophecy. As illustrated above, the doctors considered the EPR system to be mainly an administrative tool, which on occasions was found to hinder their real work as craftsmen. Their expectations of the benefits of the system were low which meant that they remained quite passive as to changing their existing practices. Neither were they interested in examining what new functionality or work procedures the EPR system could provide. Based on their perceptions of

the EPR system as an administrative tool, the doctors' use of the EPR system was very limited and this confirmed their belief that the system was of limited use. Consequently, the doctors reinforced existing work procedures and did not think in terms of changing routines to use the system.

In addition, the doctors expected that the EPR system would lead to more managerial control of their work. Previously, they received test results of patient examinations on paper which they signed to confirm that they had received and read the results. Following the EPR implementation, they now had direct access to a list of results in the system that requested an electronic signature to confirm that they had checked the results. Some doctors perceived the request to provide electronic signatures in the EPR system as a new control measure imposed by management. They considered it an intrusion on their professional autonomy and clinical freedom, disregarding that signatures were also required as part of the pre-EPR work procedures. As such the demand for signatures did not change with the new system but the doctors' view on management's intentions by requesting signatures had changed as it now became more transparent if they failed to retrieve patient examination results in due time causing the list of unsigned examinations to grow. As a consequence, some doctors refused to sign for results in the system which led to long lists of patient examinations to be signed and consequently more managerial intervention to force the doctors to provide their signatures. This reinforced the doctors' preconceptions of managerial control.

We find similar instances in the nurse context. The nurses faced difficulties in breaking old habits in relation to medicine administration. At the start of the implementation, no EPR workstation was installed in the medicine room because of what was argued to be a lack of space. The nurses had decided to print a sheet of paper for each patient with information of the prescribed medicine. They considered this work procedure to be the most appropriate even though it potentially induced errors in medication if a doctor e.g., changed a patient's medicine prescription in the EPR system without notifying the nurses and the nurses then gave the medicine to the patient based on outdated information from the printed paper sheet. Printing out medicine sheets was agreed upon to be the best solution among the nurses, and it was reinforced as a routine which confirmed their initial prediction that a workstation should not be installed in the medicine room.

These examples illustrate that the nurses and doctors, to a high degree, formed their sensemaking and their actions on the basis of beliefs which sometimes became self-fulfilling as they formed their actions based on the beliefs, and these actions then confirmed their expectations of the limited usefulness of the system.

6 Discussion and contribution

The study reveals that the healthcare professionals' early sensemaking of the EPR implementation, to a high extent, relied on existing routines, involved identity construction, and created self-fulfilling prophecies. First, we witnessed how the stock of routines and habits that existed in the clinical settings (e.g. documentation and medication routines as well as indicators of high quality care and treatment) served as a way for the professionals to resume the interrupted activ-

ity and stay in action. By relying on the existing frames of reference, both groups created perceptions and ideas about how the EPR system could become part of their clinical activities. These perceptions influenced the way in which the new technology was used and hence mediated its impact on the outcomes of the clinical work. Second, we experienced how the sensemaking implied a continuous identity construction and maintenance process where roles, status, and authority in the organizational setting had to be negotiated and re-enacted. The doctors experienced a discrepancy between being a computer user and a surgeon and they felt that their professional identity was undermined in some instances. The nurses, on the other hand, experienced a reinforcement of their status and a growing visibility of their clinical work, although their use of the system also implied less time spent on patient care and some uncertainty related to their lack of familiarity with the system. In both cases we saw how the professional identity played a dominant role in directing action by sometimes limiting their view of new possibilities and by avoiding changes to their work practices. The users enacted the EPR system in line with their retrospective identity construction as craftsmen and caretakers, respectively, and they identified the cues in the use of the EPR system which supported these identities and disregarded other cues. They did not experiment with the new ways of working that were made possible by the system, in particular, they did not pursue any kind of use that would challenge their perceived identity. Third, we saw how nurses and doctors, as part of their sensemaking, searched specific outcomes so intensively that these expectations became self-fulfilling. Such episodes evoked a behavior which maintained the professionals in their existing patterns.

The contribution of our study is two-fold. First, it contributes to our understanding of how users make sense of an IS implementation by introducing sensemaking theory as an analytical lens. The study emphasizes that IS implementation is a process unfolding in the interaction between users and technology in the local context. By applying a sensemaking perspective we are able to address what happens in this process and show how users' early meaning constructions of the technology influence their subsequent actions (Orlikowski and Gash 1994). We found that three sensemaking constructs—bracketing, enactment, and identity construction—were particularly relevant in explaining what goes on in practice when new technology is implemented. Second, our study provides a detailed analysis of how EPR systems become enacted in the early implementation phase as part of the healthcare professionals' sensemaking processes. As an EPR implementation, to a high extent, challenges the existing clinical work procedures of the professionals, it is important to understand the interplay between the technology, the users, and the work practices if we want to ensure more successful implementations.

7 Theoretical and practical implications

Our findings support existing literature by emphasizing the value of adopting a social, cognitive perspective to understand users' reactions to IS implementations (Barley 1986; Vaast and Walsham 2005). By focusing on users' sensemaking, it is possible to provide a more detailed understanding of why they react to new technology the way in which they do. Sensemaking guides people's attention and actions, and it is thus by focusing on users' meaning constructions

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that we will be able to understand how they interpret, act, and react to the technology in their organizational context.

From a sensemaking perspective, the doctors and nurses continuously constructed and tried to enhance their identity and role in the organization. These aspects were reproduced in the way they talked about the implementation, how they interacted with the EPR system, as well as how many resources they chose to put into the EPR implementation process. According to Weick (1995), establishing and sustaining an identity are core preoccupations of sensemaking. The act of sensemaking is reflected not only in a person's self-perception, but also in his or her image or identity from another's point of view (Tripsas 2009). From a sensemaking perspective, the notions of identity construction, status, and roles are relevant aspects when trying to understand the basis on which both doctors and the nurses perceived the EPR implementation and acted in relation to it.

Our study also supports the findings of earlier research which argues that users are active participants when it comes to adopting and using new technology (Weick 1995; Henfridsson 1999; Bansler and Havn 2004). Implementing EPR systems cannot be done without active participation and cooperation of healthcare professionals, as EPRs influence daily work tasks and routines. For a successful implementation to take place, professionals have to embrace the technology and make it part of their daily routines, as, for example, also pointed out by Berg et al. (1999) and Jensen and Aanestad (2007).

Our study provides practical implications as well. The emphasis on users' sensemaking processes can support managers in understanding their employees' actions and reactions towards a particular technology. This knowledge may guide them in the planning and execution of the technology implementation process and thereby facilitate a more successful process. Our findings show that the technology needs to match the work processes of professionals; however, we contend that more than a match is needed at the level of requirement and functionality, as the perceptions of the technology and its use in the daily work processes of the professionals have to cohere. In other words, the early perceptions and interpretations of how the technology influences the professionals' work need to be addressed in order to better understand their reactions. While some of the users' interpretations may be identified and addressed in the design phase, our findings show that interpretations are not always clear to the users of the system and then clash with the existing work routines during early technology use.

When implementing new technology, we suggest that managers get an understanding of their employees' needs and value orientations in order to define supporting initiatives. This is done through an open dialogue between managers, users, and designers. It is important to bring forward users' concerns, as these may have an important impact on their enactment of the system in practice—especially in a healthcare setting where a lot of autonomy is given to professionals. Management may point out potential uses and advantages of the EPR system as a justification strategy directed at professionals. This may help them break old habits and form new work procedures. An IS implementation does not add much value if the technology is not accepted by its users and if existing routines are reinforced at the expense of new possibilities. Neither does it add much value if paper-based procedures are transferred only to an electronic medium and do not have an impact on the actual behavior. This implies that managers must engage in discussions with the users about changes in work practices and role configurations as a consequence of IS implementation.

8 Limitations and future research

Our study has some weaknesses that we would like to address and which have implications for future research. First of all, the empirical study was limited to two cases of IS implementation in quite similar organizational settings within the healthcare sector. Although we have argued that this sector is particularly interesting when studying sensemaking of technology, it would be relevant to study implementation processes in others domains in order to contrast and compare findings. Another limitation of our study is the focus on doctors and nurses. We are aware that other professional groups use and have an impact on the implementation of the systems. In this study we focused on the two primary groups of professionals who interact with patients. However, it would have been relevant to include other groups, secretaries, for example, based on the assumption that their interaction with the system influences how they support the nurses and doctors, which again influences how they make sense of the system.

A final limitation is the lack of longitudinal data on the implementation process. We collected data in the early phases of the EPR implementation and do not have data on the development over a longer period of time, that is, when the first shocks have passed and the technology has become more integrated into the work processes. Suggested for future research in relation to this issue is a longitudinal focus on the interaction between users' actions and reactions towards the technology and the changes in the meaning construction in regards to the technology over time.

9 Conclusion

The main premise of this study has been that users' early interpretations of technology are of great importance to how the technology gets constructed and embedded into their everyday work practices. The purpose was to explore how users make sense of a new technology as being part of its enactment in their everyday work practices. We pursued an interpretive research approach to explore how two groups of healthcare professionals made sense of an EPR system in its early implementation phase. By looking at three constructs from sensemaking theory—bracketing, enactment, and identity construction—we showed how the EPR implementation was created and influenced by users' meanings constructions.

Based on our empirical findings, we illustrated (1) how existing routines were disrupted by the new technology, (2) how identity construction was an important part of the users' meaning construction process, and (3) how self-fulfilling prophecies were formed as a natural part of their sensemaking. Our study leads us to conclude that it is important to focus on how users make sense of new technologies in order to understand their subsequent actions and reactions and thereby facilitate the process of implementing the technology to the specific practice. We thus encourage researchers in the IS field to use sensemaking as an analytical lens in future studies of IS implementation.

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